

2014 Nobel Prize in Chemistry Goes to Stefan Hell

Highest scientific award for Director at the Max Planck Institute for Biophysical Chemistry



Nobel laureate: Stefan Hell is the 18th Max Planck researcher to receive a Nobel Prize since the foundation of the research organization in 1948.

This year's Nobel Prize in Chemistry honors pioneering work in the area of ultra-high-resolution fluorescence microscopy. Max Planck Director Stefan Hell shares the award with US scientists Eric Betzig and William E. Moerner. Hell revolutionized microscopy with his concept of Stimulated Emission Depletion (STED). It isn't possible to perceive objects separately that are fewer than 200 nanometers (millionths of a millimeter) apart using traditional optical microscopes. Hell's concept is thus based on a trick: As with the fluorescence microscope, fluorescing molecules are excited by a beam of light. However, a second beam of light then triggers the opposite effect: it immediately calms the molecules and keeps them dark. In addition, the STED beam has a hole in the middle so that the molecules on the edge of the stimulating light spot become dark, but the molecules in the center can continue to shine without being affected.

Thanks to this technology, cellular structures can be viewed at a level of detail up to ten times greater than that offered by traditional fluorescence microscopes. It is even possible to follow processes in the interior of living cells. STED can therefore make a valuable contribution to the search for the molecular causes of diseases and the mechanisms of drug action.

Strong Voices from Economic Research

Four Max Planck Directors among the top 20 in the FAZ Ranking of Economists

The entire country listens to these economic researchers – this was the headline under which the German newspaper FRANKFURTER ALLGEMEINE ZEITUNG published its “2014 Ranking of Economists” in early September. Dietmar Harhoff, head of the Department of Innovation and Entrepreneurship Research at the Max Planck Institute for Innovation and Competition in Munich, placed fifth in the ranking. Three other Max Planck Directors were also among the top 20: Kai Konrad from the Max Planck Institute for Tax Law and Public Finance, Martin Hellwig from the Max Planck Institute for Research on Collective Goods in Bonn, and Axel Börsch-Supan, Director of the Munich Center for the Economics of

Aging at the Max Planck Institute for Social Law and Social Policy.

A crucial role in the evaluation, according to the FAZ, is the influence of the economic researchers in the political arena and in the media, which accounts for 50 percent of their ranking. This was established on the basis of a survey carried out among parliamentarians and managers at the federal and state levels, as well as from media quotes published over the previous 12-month period. The other half of the evaluation focuses on the scientists' research and is based on citations in trade journals from 2010 to 2014.

Among the top 20 German economists: Kai Konrad, Dietmar Harhoff, Martin Hellwig and Axel Börsch-Supan (clockwise from top left).

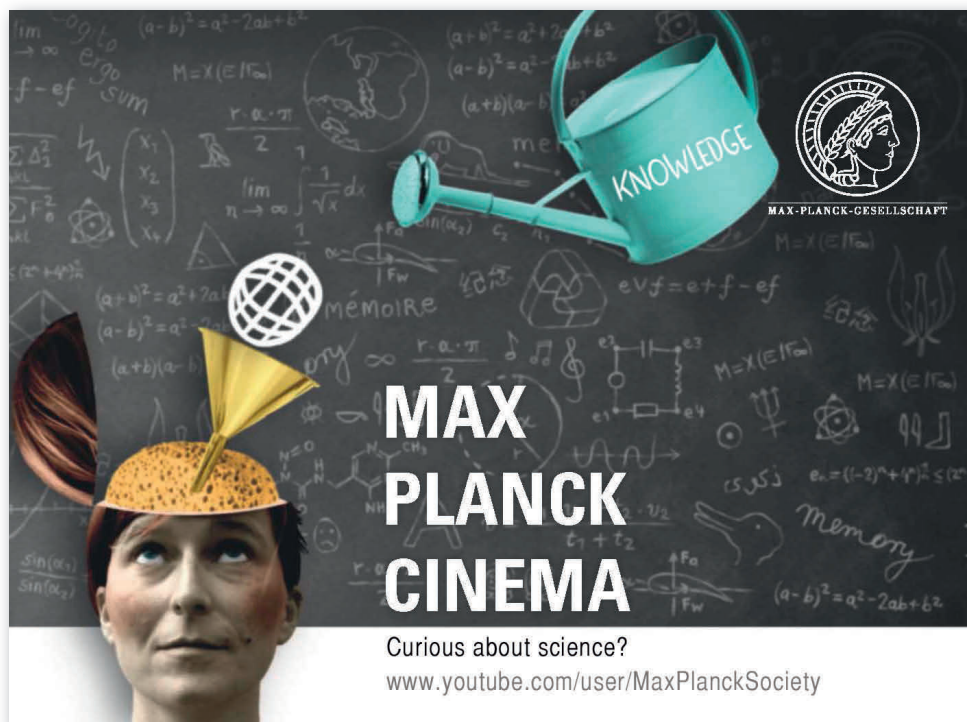


Cameras Roll for Science

MaxPlanckCinema goes online and is promoted via social media

A comprehensive series of films entitled “MaxPlanckCinema,” which provide original and ambitious presentations of research from the Max Planck institutes, has been produced over the past three years. With these films, the communications officers of the Max Planck Society aim to show that challenging scientific topics can be presented in formats that differ from those used in traditional adult education broadcasting. The educational suitability of the films was tested in cooperation with education experts from the University of Würzburg. Over 650 teachers throughout Germany participated in the online survey. The result: “The introduction stimulates the desire to learn, and the visualization makes many things clearer that would otherwise require lengthy verbal explanations.”

Various contributions from the series have received awards at numerous international festivals. Four films have been nominated for the Goethe Institute’s Science Film Festival 2014 alone, which takes place from October to December 2014 in Asia and attracts over 400,000 visitors. With the help of a so-



cial media campaign, the Max Planck Society is now gradually seeking to target particularly a younger audience with this gratis service.

Research plays a starring role: The films, in which the Max Planck Society presents science and research in an original and sophisticated format, include witty cartoons and animations.

Open Access to Historical Sources

The Max Planck Institute for the History of Science publishes Edition Open Sources

How many people have heard of Nicolò Tartaglia’s 1537 treatise *Nova Scientia*? The work, which forms the basis of modern ballistics, can be downloaded free of charge from Edition Open Sources. This was made possible by a cooperative effort between the Max Planck Institute for the History of Science with the History of Science Collections and the Department of the History of Science at the University of Oklahoma. Edition Open Sources set itself the goal of making primary sources from the history of science accessible to a wide audience. Each edition

from the catalog, which currently includes six works, presents an original source with transcriptions and critical analyses. A PDF and e-book edition can also be obtained from the edition-open-sources.org Internet platform. And those who would like to hold a printed edition of one of the books in their hands can purchase print-on-demand editions. The Max Planck Institute for the History of Science is a pioneer of the Open Access movement, which promotes free access to scientific information throughout the world.

“Life is longer without the wall”

Interview with sociologist Tobias Vogt from the Max Planck Institute for Demographic Research



Tobias Vogt

Twenty-five years after the fall of the Berlin Wall, is it possible to say that the division of Germany has been overcome? Is life in the East and West now pretty much the same? Demographic indicators – above all mortality and fertility – are very helpful in providing answers to these questions. For this reason, politicians consult these metrics. Scientists at the Max Planck Institute for Demographic Research study both of these areas and quickly dispense with the idea that the East is already exactly the same as the West. A conversation with sociologist Tobias Vogt about this, as he puts it, “fruitful topic.”

These days, people everywhere are commemorating and celebrating the 25th anniversary of the fall of the Berlin Wall. But apparently the parallel existence of two German systems was not such a bad thing for you, right?

Tobias Vogt: (laughs) In principle, you're right. I have to admit that, from a scientific perspective, the Wall was a gift. It gave us amazing experimental setups. A population is divided spatially, lives under completely different conditions for four decades and is then reunited. You could not have simulated these conditions in any experiment. Nevertheless, it was a good thing that the Wall came down again. This meant we could discover that the significant gap in the life expectancy of people in the West and East is closing again.

What is your own personal relationship with the GDR and the Wall?

I come from Jena and studied sociology and social policy in Halle and London. I was twelve years old when the wall came down. At that age you notice things changing. At school, in particular, a lot of things were different after 1990 – not just the curriculum. Many children

stopped coming to school because their families had moved and jobs were lost. The streetscape changed, as did the coloration of the cities. And, something I can remember very clearly: as an exception, you were allowed to buy New Year's firecrackers for October 3, 1990 ...

Certain myths, which the Max Planck Institute is trying to dispel, persist in relation to East and West. Regarding the topic of the “East's low birth rate,” for example. What's not right about this?

The aim of the GDR in the 1970s was to increase its birth rate, so it launched a successful pro-natalist policy. I was born in 1977 and am more or less a child of this period myself. Then reunification came and the birth rate plummeted – probably due to the enormous insecurity faced by people. Fewer children were born at the time than during the two world wars. In the meantime, however, the East's birth rate has overtaken that of the West again. In-depth analyses show that the number of children people ultimately had was higher than in the West; people merely delayed having children. This is not really surprising, as the attitude to children and external child care was always very different in the East than in the West.

Another myth concerns the influence of the GDR on current developments in East Germany. It wasn't as significant as it seemed, was it?

The GDR was not an isolated phenomenon. Stable historical patterns can be observed in demographic sub-areas – what could be described as the staying power of history. Recent research shows that differences in relation to births outside marriage existed long before the GDR. This was not a result of the division of Germany. And life expectancy in Dresden was always higher than in some cities in the West.

Life expectancy and mortality are currently your own favorite topics. Why?

Even if they are not the main aspects of a research project – considerable attention is paid to these topics internationally and papers on them are always welcome at conferences. This is because an astonishing development has taken place in this area in the last 25 years: nowadays, women and men in the East live almost as long as they do in the West. They have really caught up and, as early as 2011, their life expectancy had increased by 6.6 and 7.9 years respectively since 1990. The corresponding increase in the West was only 3.9 for women and 5.7 for men. Even in Japan, the country with the world's highest life expectancy, which has risen steeply in recent years, people gained fewer years of life than in the East.

And how do you explain this?

Older people, in particular, are benefiting from better medical care. Moreover, public spending for social insurance increased for Germans in the East. Their pensions are higher than before, which means that they have a better standard of living. The extra money may also be benefiting their children, who now take better care of their parents and enable them to have a carefree old age. There has also been a considerable decline in air pollution in eastern Germany.

How much longer will you be able to benefit scientifically from the “Wall experiment”?

For quite a while, I think. The situation with regard to data is still unclear and many sources remain that have yet to be accessed. This phenomenon is familiar

Max Planck Research Award for Quantum Physicists

Robert J. Schoelkopf and Jörg Wrachtrup recognized for their pioneering achievements

from other countries, for example South Africa, where parallels arise with the end of apartheid. We are in demand as scientific “truffle hunters” who mine for data. The Federal Environmental Agency, the German Cardiac Society (DGK) – valuable information about mortality could be found in institutions like these. I am traveling to the Federal Archives in Berlin-Lichterfelde with a colleague tomorrow. The social insurance data of East Germany’s FDGB (Free German Trade Union) are stored there, among other things. The purpose of our trip is to look at these records, take samples and consider whether they are worth digitizing.

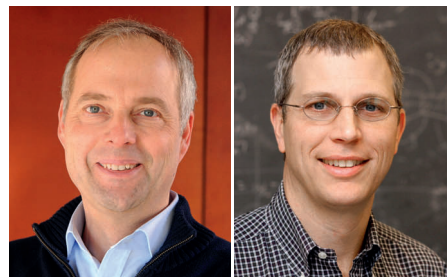
That sounds exciting ...

...yes, it is. Although it’s not the focus of media interest, we can now state definitively that if the Wall were still standing, boys born today would live 6.2 fewer years on average and girls 4.2 years. Life is longer without the Wall. That’s the good news we can assert based on our research!

Interview: Susanne Beer

The future belongs to quantum computers. They can search through large volumes of data much faster than traditional computers – albeit mainly in theory up to now. The work carried out by Robert J. Schoelkopf and Jörg Wrachtrup represents a major advance in the development of quantum information technology. In honor of their achievements, the Alexander von Humboldt Foundation and the Max Planck Society have presented them with the Max Planck Research Award 2014.

Jörg Wrachtrup, professor at the University of Stuttgart and Fellow of the Max Planck Institute for Solid State Research studies isolated spins in solid matter. Spin is a quantum mechanical property of electrons and atomic nuclei and turns them into tiny magnetic needles. Wrachtrup succeeded in reading out the orientation of a single spin in a diamond and controlling it for the first time. Such spins are suitable for use as, among other things, quantum bits, or qubits, the smallest computing units of a quantum computer. Robert J. Schoelkopf, professor at Yale University, is one of the inventors of superconducting qubits. Superconductors transport electricity with zero electrical resistance. The qubits that Schoelkopf developed with his colleagues consist of superconducting electronic circuits. Such circuits can assume defined energy states similar to those of an atom. The lowest two can also encode the “0” and “1” of a data bit.



Outstanding researchers:
Jörg Wrachtrup, University of Stuttgart (left)
and Robert J. Schoelkopf, Yale University.

On the Net



Shining New Light on the Nano World

The STED microscope developed by Stefan Hell breaks through, for the first time, the magical resolution limit of 200 nanometers that was formulated by Ernst Abbe over 100 years ago, and enables researchers to carry out optical microscope studies on living cells at the nanoscale. This film provides an illuminating and accessible presentation of the achievements of this year’s Nobel laureate in chemistry, who researches at the Max Planck Institute for Biophysical Chemistry in Göttingen.
www.youtube.com/watch?v=ONCNY6pVIZE

Postdoc Platform

How can you explain your own research topic in just two minutes? The Hyman Lab of the Max Planck Institute of Molecular Cell Biology and Genetics has announced a competition for postdocs. In addition to practical tips for young scientists, seminars and images, the resulting videos are included in a blog by the Dresden-based postdoc community presented on the Wordpress platform. The blog provides postdocs with an opportunity to exchange information and to network beyond the boundaries of their institutes and universities.
dresdenpostdocs.wordpress.com

Dossier on the Rosetta Mission

The Rosetta space probe has reached the destination of its decade-plus journey. The signal was received at the ESA control station in Darmstadt at 11:30 a.m. on August 6: the Rosetta has arrived at the comet 67P/Churyumov-Gerasimenko. The Philae lander touched down on the comet on November 12. Astronomy enthusiasts can find all of the important background information on the Rosetta mission – articles, images and videos – in a new Max Planck Dossier.
www.mpg.de/8310003/rosetta_mission